**SECTION 00843**

# GRAVEL

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. Production and delivery of unwashed gravel.

### 1.2 REFERENCES

A. AASHTO T 11: Materials Finer than 75 μm (no. 200) Sieve in Mineral Aggregates by Washing.

B. AASHTO T 19: Unit Weight and Voids in Aggregate.

C. AASHTO T 27: Sieve Analysis of Fine and Coarse Aggregates.

D. ASHTO T 89: Determining the Liquid Limit of Soils.

E. ASHTO T 90: Determining the Plastic Limit and Plasticity Index of Soils.

### 1.3 DEFINITIONS

A. **Mean of the Deviations:** The sum of the absolute values of the deviations divided by the number of tests in the lot.

### 1.4 SUBMITTALS

A. Ten days before delivery begins, submit a written report on the following:
   1. Aggregate suitability. Refer to this Section, Part 2.
   2. Name of supplier and source.
   3. Gradation including single values for each sieve size based on the dry weight of the aggregate.

B. Resubmit all quality documents 24 hours before a day's production starts if a change in source is required.

1. Changes must fall within bands of Table 2 in this Section, and are subject to approval.
2. Retroactive changes are allowed only for the first day's production for each construction season.

## 1.5 QUALITY ASSURANCE

A. Remove products found defective at no additional cost to the Department.

## 1.6 ACCEPTANCE

A. Engineer takes random sample at the aggregate source.

B. Acceptance will be on a lot-by-lot basis where a lot consists of a single day's production.
   1. Conduct one random moisture, gradation and density test within each sublot. AASHTO T 310.
   2. If the Mean of the Deviations of test results varies from the Combined Aggregate Target more than the minimum shown under the 0.70 pay factors of Table 2, the pay factor for the material allowed to remain in place is 0.50. This applies only if the Engineer does not order correction or removal of any or all of the material represented by the tests.
      a. The results of five density tests must indicate that the average of 97 percent of maximum laboratory density has been met with no test less than 94 percent. AASHTO T 180, Method D.

**Table 2**
**Pay Factors for Aggregate Gradation**

**Mean of The Deviations of Sieve Gradation Results From The Combined Aggregate**

**Target - Expressed in Percentage Points**

| SIEVE SIZES | Pay Factor | 1 TEST Max-min | 2 TESTS Max-Min | 3 TESTS Max-Min | 4 TESTS Max-Min | 5 TESTS or More Max - Min |
|---|---|---|---|---|---|---|
| ½ inch and Larger | **1.00** | 0 - 15 | 0.0 - 12.1 | 0.0 - 10.8 | 0.0 - 10.0 | 0.0 - 9.5 |
| | **0.95** | 16 - 17 | 12.2 - 13.9 | 10.9 - 12.4 | 10.1 - 11.5 | 9.6 - 11.0 |
| | **0.90** | 18 - 19 | 14.0 - 15.1 | 12.5 - 13.5 | 11.6 - 12.5 | 11.1 - 11.9 |
| | **0.80** | 20 - 21 | 15.2 - 17.2 | 13.6 - 15.3 | 12.6 - 14.2 | 12.0 - 13.5 |
| | **0.70** | 22 - 23 | 17.3 - 18.8 | 15.4 - 16.7 | 14.3 - 15.5 | 13.6 - 14.7 |
| 3/8 inch | **1.00** | 0 - 15 | 0.0 - 11.5 | 0.0 - 9.8 | 0.0 - 8.8 | 0.0 - 8.0 |
| | **0.95** | 16 - 17 | 11.6 - 13.3 | 9.9 - 11.3 | 8.9 - 10.1 | 8.1 - 9.2 |
| | **0.90** | 18 - 19 | 13.3 - 14.4 | 11.4 - 12.3 | 10.2 - 11.0 | 9.3 - 10.0 |
| | **0.80** | 20 - 21 | 14.5 - 16.3 | 12.4 - 13.9 | 11.1 - 12.5 | 10.1 - 11.4 |
| | **0.70** | 22 - 23 | 16.4 - 17.9 | 14.0 - 15.2 | 12.6 - 13.6 | 11.5 - 12.4 |
| No. 4 | **1.00** | 0 - 14 | 0.0 - 10.5 | 0.0 - 8.8 | 0.0 - 7.8 | 0.0 - 7.0 |
| | **0.95** | 15 - 17 | 10.6 - 12.1 | 8.9 - 10.1 | 7.9 - 9.0 | 7.1 - 8.0 |
| | **0.90** | 18 | 12.2 - 13.1 | 10.2 - 11.0 | 9.1 - 9.8 | 8.1 - 8.7 |
| | **0.80** | 19 - 20 | 13.2 - 14.9 | 11.1 - 12.5 | 9.9 - 11.1 | 8.8 - 10.0 |
| | **0.70** | 21 - 22 | 15.0 - 16.3 | 12.6 - 13.6 | 11.2 - 12.1 | 10.1 - 10.8 |
| No. 16 | **1.00** | 0 - 11 | 0.0 - 8.2 | 0.0 - 6.9 | 0.0 - 6.2 | 0.0 - 5.6 |
| | **0.95** | 12 - 13 | 8.3 - 9.4 | 7.0 - 7.9 | 6.3 - 7.1 | 5.7 - 6.4 |
| | **0.90** | 14 | 9.5 - 10.3 | 8.0 - 8.6 | 7.2 - 7.8 | 6.5 - 7.0 |
| | **0.80** | 15 - 16 | 10.4 - 11.6 | 8.7 - 9.8 | 7.9 - 8.8 | 7.1 - 8.0 |
| | **0.70** | 17 | 11.7 - 12.7 | 9.9 - 10.7 | 11.7 - 12.7 | 8.1 - 8.7 |
| No. 50 | **1.00** | 0 - 9 | 0.0 - 7.0 | 0.0 - 6.1 | 0.0 - 5.5 | 0.0 - 5.2 |
| | **0.95** | 10 | 7.1 - 9.0 | 6.2 - 7.0 | 5.6 - 6.3 | 5.3 - 6.0 |
| | **0.90** | 11 | 9.1 - 8.8 | 7.1 - 7.6 | 6.4 - 6.9 | 6.1 - 6.5 |
| | **0.80** | 12 - 13 | 8.9 - 10.0 | 7.7 - 8.7 | 7.0 - 7.8 | 6.6 - 7.4 |
| | **0.70** | 14 | 10.1 - 10.9 | 8.8 - 9.5 | 7.9 - 8.5 | 7.5 - 8.1 |
| No. 200 | **1.00** | 0 - 4.5 | 0.0 - 3.4 | 0.0 - 2.9 | 00 - 2.5 | 0.0 - 2.3 |
| | **0.95** | 4.6 - 5.2 | 3.5 - 3.9 | 3.0 - 3.3 | 2.6 - 2.9 | 2.4 - 2.6 |
| | **0.90** | 5.3 - 5.6 | 4.0 - 4.3 | 3.4 - 3.6 | 3.0 - 3.1 | 2.7 - 2.9 |
| | **0.80** | 5.7 - 6.4 | 4.4 - 4.8 | 3.7 - 4.1 | 3.2 - 3.6 | 3.0 - 3.3 |
| | **0.70** | 6.5 - 7.0 | 4.9 - 5.3 | 4.2 - 4.5 | 3.7 - 3.9 | 3.5 - 3.6 |

F. Price Adjustments - Gradation:

1. Based upon number of samples per lot and the minimum pay factor.
2. Pay factors for aggregate gradation when tested in accordance with AASHTO T 27 are indicated in Table 2.

## PART 2 PRODUCTS

### 2.1 AGGREGATES

A. Clean, hard, tough, durable and sound mineral aggregates that consist of crushed stone, crushed gravel or crushed slag; free of detrimental and organic matter; and complies with Table 3 and Table 4.

**Table 3**

| **Aggregate Properties** | | |
|---|---|---|
| Dry Rodded Unit Weight | Not less than 75 lb/ft$^3$ | AASHTO T 19 |
| Material Passing No. 40 Sieve | Non plastic | AASHTO T 90<br>AASHTO T 89 |
| Dry Weight Values | Within bands shown in Table 4 | |
| Gradation Limits | Table 4 | AASHTO T 11<br>AASHTO T 27 |

**Table 4**

| **Gradation Limits** | | | |
|---|---|---|---|
| **Sieve Size** | **Percent Passing of Total Aggregate (Dry Weight)** | | |
| | ¾ inch | 1 inch | 1-1/2 inch |
| 1-1/2 inch | -- | -- | 100 |
| 1 inch | -- | 100 | -- |
| 3/4 inch | 100 | -- | 81 -91 |
| 1/2 inch | 78-90 | 79 - 91 | 67 - 77 |
| 3/8 inch | -- | -- | -- |
| No. 4 | 48-60 | 49 - 61 | 43 - 53 |
| No. 16 | 27-35 | 27 - 35 | 23 - 29 |
| No. 200 | 6-10 | 7 - 11 | 6 – 10 |

B. Recycled Asphalt Pavement (RAP): Do not use RAP.

## PART 3 EXECUTION

### 3.1 DELIVERY

A. Deliver to locations listed on bid schedule FOB

B. Stockpiles: Gravel stockpiling method for is specified for each delivery location. The method will be one of the following:

1. Method 1: Stockpile by butting loads – Build stockpiles at designated locations. Supplier uses end dumps, end dumps and pups, or belly dumps to haul material. Butt end dump loads one against the other in such a manner as to occupy as small a total stockpile area as possible. If the supplier elects to use belly dumps or pups, he must supply equipment to keep the stockpile pushed up to cover an area no larger than a stockpile area produced by an end dump. If Engineer is not satisfied with the stockpiling, supplier reshapes the stockpile to an acceptable configuration. If UDOT personnel reshape the stockpile, the cost of reshaping is deducted from the contract.
2. Method 2: Stockpile by supplier-furnished loader – Build stockpiles at designated locations. Supplier uses end dumps, end dumps and pups, or belly dumps. Supplier places each load and load is "bucked up" using a supplier-furnished loader and operator. Stockpiles occupy as little space as possible and are bucked up to a uniform 10-foot height. If Engineer is not satisfied with the stockpiling, supplier reshapes the stockpile to an acceptable configuration. If UDOT personnel reshape stockpile, reshaping cost is deducted from the contract.
3. Method 3: Stockpile by state forces shaping pile – Build stockpile at designated locations. Supplier uses end dumps, end dumps and pups, or belly dumps. State forces shape stockpile.

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END OF SECTION

**Change One – April 27, 2002**
**Created document from specification 00841**
**Added ¾" gravel gradation and stockpile method – September 1, 2004**